Effect of A Priori on OMI total $O_3$ retrieval

$$\Omega_{meas} = \int n(z)w(z)dz$$

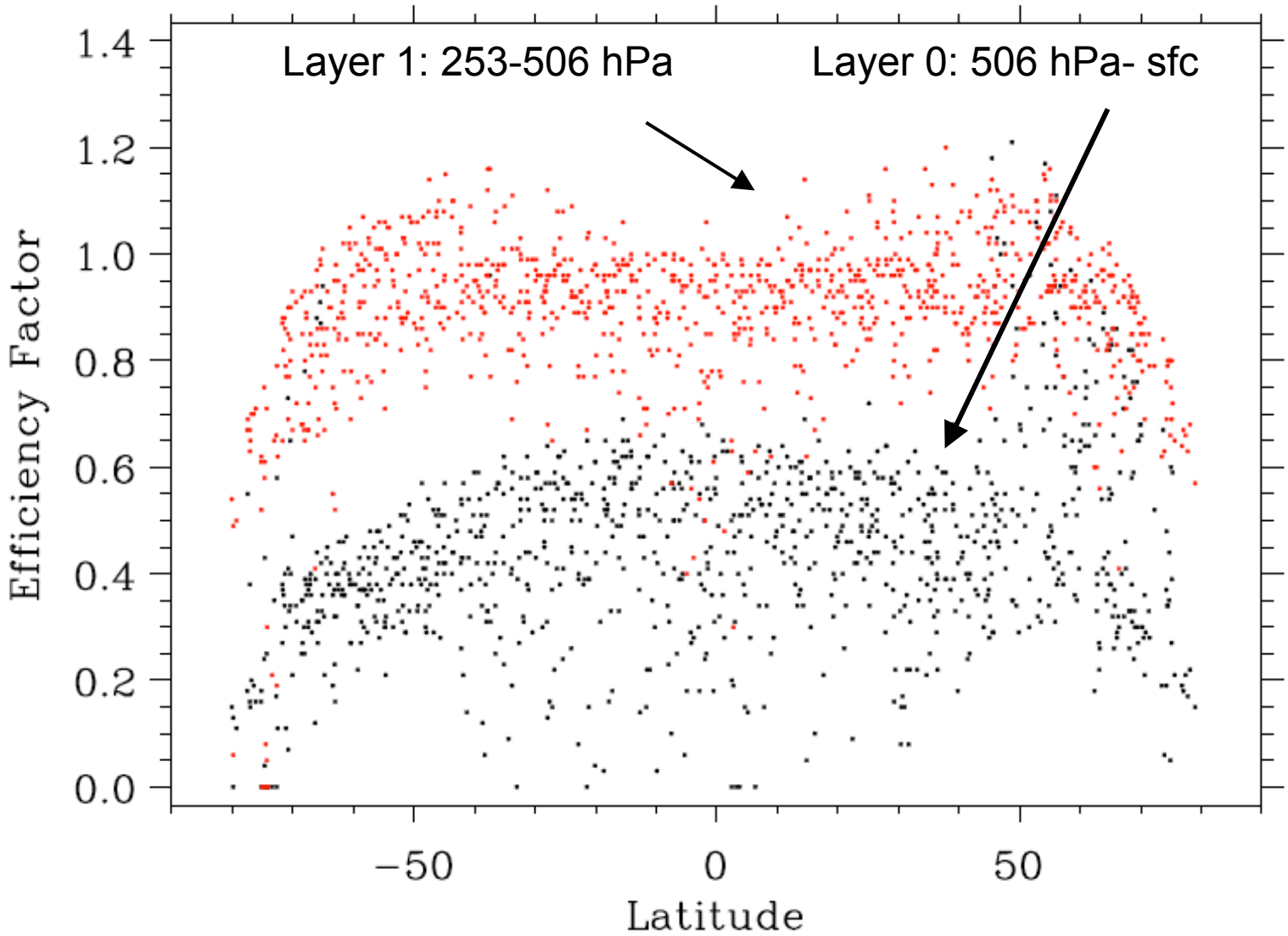
$$\Omega_{retr} = \Omega_{meas} + \int n_{ap}\left[1 - w(z)\right]dz$$

In the 0-5 km layer more than 60% is a priori, in 0-2 km layer it becomes more than 80%.

If the MR around 700 hPa is roughly constant, then it can be shown that $\Omega_{meas}$ is the column $O_3$ down to an effective pressure $p_{eff}$, given by

$$p_{eff} = \int pw(z)dz$$

# Layer Efficiency Factors (aka AK)
# MARCH



# Cloud Effects

- Clouds are usually brighter than the surrounding atmosphere so the effective cloud fraction is usually larger than the geometrical cloud fraction. For thin clouds, such as cirrus, the effect is opposite.
  - Radiative Cloud Fraction (RCF) concept has been developed to capture this effect.
- For mixed scenes containing ice and water clouds, most of the radiation is scattered from near the top of water clouds.
  - Scattering cloud heights in UV/VIS are several km lower than that measured by thermal emission methods.
- OMTO3 (based on TOMS V8 algorithm ca 2003) doesn't accurately capture these effects.
- OMDOAS Coll 3 data should be used for trop $O_3$ studies.